required warmer and drier conditions than the present. Although probably most of the observed accumulations are relicts of former environmental conditions, there is clear evidence of recent or subrecent formation of silica polymorphs as well. The latter is observed for example in a pedon including a palycrete more than 2 m thick. Palygorskite develops under semiarid conditions combined with high abundance of Si and Mg. Under the recent Mediterranean conditions, it is not stable anymore. Thus, palygorskite is transformed to smectite in the upper horizons of the profile, but, simultaneously, amorphous/poorly-crystalline silica is formed in pores of underlying horizons.

S30.B.06
Determination of multifractal spectra in three dimensional soil aggregate images

A. N. Kravchenko[1]*, A. J. M. Smucker*[1]*, M. L. Rivers*[2]*;*
[1]Crop and Soil Sciences, Michigan State University, East Lansing, MI, United States, [2]APS/CARS-CAT, The University of Chicago, c/o Argonne National Laboratory, Argonne, IL, United States.

Multifractal methods have a potential to be useful tools for characterizing spatial distributions of soil pores from microtomographic images of undisturbed soil cores and soil aggregates. However, most of the studies that apply multifractal analyses to soil images work with 2D image cross-sections. This raises a question of how informative a cross-section's data are for characterizing the entire 3D medium of soil aggregate or soil core. The first objective of this study is to apply multifractal analyses to the 3D images of soil aggregates and to assess usefulness of data from individual 2D cross-sections. The second objective is to examine the multifractal characteristics of the pore space in interiors and exteriors of soil aggregates. We will test the hypothesis that in well-formed stable aggregates the pore distribution in internal aggregate layers differ from that in external layers contributing to stronger inner core of such aggregates. Twelve aggregates ranging in size from 6 to 9 mm from Typic Fragiudalf soil under long-term row-crop agriculture were used in the study. The aggregate image data were collected on the bending magnet beam line, station 13-BM-D of the GeoSoilEnvironCARS (GSECARS) at the Advanced Photon Source (APS), Argonne National Laboratory (ANL), IL. Multifractal spectra for 2D and 3D images of the internal and external portions of the aggregates will be reported and discussed.

S30.C.01
Phytolith transport in sandy soil: experiments and modeling

O. Fishkis*, J. Ingwersen, T. Streck;*
University of Hohenheim, Institute of Soil Science and Land Evaluation, (310) Biogeophysics, Stuttgart, Germany.

Soil phytoliths have been widely used in paleoenvironmental reconstructions. However, the mechanisms controlling phytolith distribution in soil are not well understood, which causes uncertainties in the interpretation of phytolith data. The objectives of the present study were (1) to determine vertical displacement of phytoliths by moving water in a sandy soil, and (2) to model phytolith transport for assessing the long-term phytolith distribution in sandy soil.
Six intact cores of Haplic Cambisol (27 cm length and 10.3 cm i.d.) were excavated in Schurwald, South Germany. Silica phytoliths were extracted from Phragmites australis and labelled by fluorescent dye fluorescein isothiocyanate. The labelled phytoliths were applied on the surface of each column. Three cores were periodically irrigated resulting in a cumulative water flux of 3600 mm, while three other cores were left without irrigation as a control treatment. The duration of experiment was 6 months. After the experiment was finished the cores were sliced into layers of 0.5 cm to 2 cm thickness. One sample from each layer was analysed for phytolith concentration in five replicates. A confocal LSM microscope was used for detecting the fluorescent labelled phytoliths and 3D image acquisition. The image processing was done using the ImageJ freeware code to obtain absolute number, size and shape characteristics of phytoliths in each layer. Finally the weighted mean travel distance of phytoliths was calculated. The effect of size and shape on phytolith transport is discussed. Phytolith transport was modelled using a convection-dispersion model with attachment, detachment and straining terms. The resulting set of differential equations was solved numerically using the package Berkeley Madonna 8.1. Our preliminary experimental results indicate significant translocation of phytoliths in sandy soil by percolating water. Hence, we expect the transport of phytoliths with the percolating water to be an important process of phytolith displacement in sandy soil.

S30.C.02
Semi quantitative analysis of clay illuviation in Alfisols of subhumid regions of northern Iran, Golestan

F. Khormali*, S. Ghergherechi;*
Gorgan University of Agricutural Sciences and Natural Resources, Gorgan, Iran, Gorgan, Iran (Islamic Republic of).

Formation of argillic horizons in loess derived soils of Golestan Province was investigated. To evaluate clay orientation, four pedons from two different soil moisture regimes were studied using micromorphological techniques. Studied pedons were classified as *Hapludalfs* and *Haploxeralfs*. The precipitation evapotranspiration (P/ET^O) ratio ranges from 0.62 to 0.84 in the study area. The main objectives were to semi-quantitatively analyze the clay orientation and to study the micromorphological factors affecting the development of argillic horizons. The most developed clay coatings observed in the xeric moisture regime were thin and discontinuous, and generally associated with channels and chambers. Thick and continuous illuvial coatings with strong orientation pattern were observed in the udic regions where P/ET^O ratio exceeded 0.8. Occurrence of illuvial clay features associated with pedogenic carbonates in the same depth was found as one of the significant features of loess derived soils in the study area. The dominant microstructures were moderately developed subangular blocky indicating stress of micromass caused by high shrink/swell activity. The coefficient of linear extensibility ranges from 0.04 to 0.07 that demonstrate high shrink/swell potential. Clay coatings were observed mainly in soils with smectite and vermiculite as the dominant clay minerals. In the well-developed horizons, the occurrence of vermiculite clay mineral reduced the shrink/swell potential and increased quantity and orientation of clay coatings. In all pedons the clay increase and degree of orientation had a good correlation with the P/ET^O ratio but could be attributed to a particular genetic process. Both illuviation processes and shrink/swell activity have affected the orientation of clay coatings. Thickness and the area of the thin sections covered with clay coatings ranged from 20 to 300 (µm) and 2 to 10 % respectively. Clay orientation observed from weakly oriented, to strongly oriented associated with pedogenic carbonates in xeric and udic soil moisture regimes, respectively.

S30.C.03
Using ΔpH as a geochemical index of illite neoformation in saprolite

F. Bétard[1]*,* ***L. Caner***[2]*, Y. Gunnell*[3]*, G. Bourgeon*[4]*;*
[1]University of Paris Sorbonne - UMR CNRS 8591- Laboratoire de Géographie Physique, Paris, France, [2]University of Poitiers - FRE CNRS/INSU 3114 HydrASA, Poitiers, France, [3]University of Paris Diderot - UMR CNRS 8591 - Laboratoire de Géographie Physique, Paris, France, [4]CIRAD - UPR Recyclage et Risque, Montpellier, France.

Soil pH is routinely measured for agronomic purposes. When the difference between KCl pH and H_2O pH, or ΔpH, yields positive values, it is used by soil scientists as a classification criterion for identifying anionic subgroups according to the Soil Taxonomy or geric properties according to the WRB. Negative values have not been granted much attention. Here we focus on the occurrence of highly negative ΔpH values in the weathering zone of profiles developed on gneiss in semiarid Northeast Brazil and semiarid South India and interpret them as proxies of a geochemical weathering process involving the neoformation of illite.
Detailed optical, chemical and mineralogical characterizations involving scanning electron microscopy coupled with X-ray element mapping demonstrate the neoformation of illite inside plagioclase feldspar crystals after their partial dissolution. This study thus reveals that meteoric weathering is capable of producing illite not only from mica, *i.e.*, by a transformation process, but also within non-alkali feldspar by a neoformation process. The ΔpH is shown to be a good proxy for detecting such weathering signatures because the recently neoformed illite flakes, which present a significant compositional deficit in K, reveal their presence by a detectable uptake of K from the KCl solution. This finding changes the perspective over the origin of illite in continental environments, which has most commonly been attributed to hydrothermal processes.

Posters

(Please note that the posters are ordered by presentation number according to the postersessions during which they were presented)

S20 Soil Classification

P001
Genesis and classification of some soils derived from gypsiferous and calcareous material in Wadi el-Sheikh, Beni Suef, Egypt

***G. W. Ageeb**, R. R. Ali;*
National Research Center, Cairo, Egypt.

This study examined pedogenesis, of soils derived from calcareous and gypsiferous parent materials in Wadi el-Sheikh, opposite Al Fashn, Beni Suef, Egypt. The main objectives of this research were to study the relationship between clay minerals and physiographic units as well as the relative importance of key pedogenic processes in controlling clay mineralogy. Palygorskite, chlorite, illite, smectite, quartz and interstratified minerals were observed in soil samples, using XRD analyses. Gypsiferous soils showed more pedogenic palygorskite as compared to calcareous soils. Lithic Gypsicalcids and Calcigypsids, Typic Calcigypsids, Lithic Haplocalcids, Haplocalcids Calcic Haplosalids are the classification of the studied samples. Dissolution and transport of anhydrite from outcrops, is considered the main source of pedogenic gypsum in these soils. Micromorphological studies, of thin section observations indicated variable habits of gypsum crystals suggested a dynamic soil environment.

P002
Spectrophotometric method of Soil Classification

***A. M. Jafarov**, A. P. Gerayzade;*
Institute of Soil Science and Agrochemistry, Baku, Azerbaijan.

For various types of soil by means of special spectrophotometer the packages of curves of reflection of electromagnetic waves in the field of a visible and near infra-red spectrum are received. On the basis of the complex analysis of the received curves factors of chromaticity, integrated factor of reflection are received. All factors compared to various characteristics of soil. Correlation dependences between reflective property of soil and various parameters of soil are established. For example, it is shown that between the contents of organic substance in soil and reflective ability of soil exists a feedback. The same connection exists and between reflective ability and humidity of soil.
Between the contents of carbonic calcium and factor of reflection of ground there is a direct dependence. Similar dependence exists between the contents of salts and factor of reflection of soil etc.
To differentiate a share of influence of each factor values of factor of reflection were used at various lengths of waves.
On the basis of the combined analysis the model for definition of color parameters of soils in three-dimensional measurement is offered, i.e. each soil type is characterized by three numerical values. Advantage of an offered way of soil classification that all types of soil are investigated in identical conditions.